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##### Sculpture in space honours world's first black astronaut

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##### InSight unlatches its robotic arm on Mars

NASA's InSight spacecraft unlatched its robotic arm on Nov. 27, 2018, the day after it landed on Mars and is sending pictures back to Earth...p15



From the Editor



Most of us know from our school history lessons that more than 2000 years ago the Great Library in the city of Alexandria in Egypt made it the capital of knowledge and learning of the world. The Library reportedly held hundreds of thousands of scrolls - the equivalent of today's books - which represented just about all the writings the human race could muster by then. It was truly the cradle of human knowledge and the gathering place of scholars of the time.

The African Association for Remote Sensing of the Environment could therefore hardly have found a more fitting setting for its 12th biennial conference in October this year than the city of Alexandria. It was indeed a true gathering of minds with the common purpose to exchange knowledge on how to better the lives and living

conditions of Africa's peoples. Academics, researchers and industry leaders from at least 35 countries spent five days from 25 to 29 October to make their contributions through some 130 sessions of academic paper presentations and workshops. Most of these had to do with utilising satellite technology to the advantage of the African society at large. In this issue we give you an extensive overview of what the AARSE2018 Conference was all about with some more to follow in our February newsletter next year.

As the newly appointed editor for the Association's newsletter it has now become my task to assist in its primary aim which is to 'increase the awareness of African governments and their institutions, the private sector and the society at large, about the empowering and enhancing benefits of developing, applying and utilising responsibly, the products and services of Earth Observation Systems and Geo-information Technology'.

Africa is a vast continent where numerous communities face physical obstacles which hamper their progress. Much has been suggested about what should be done to accelerate economic growth in Africa and eradicate poverty. Then satellite technology fell into our laps. Suddenly we have multiple solutions to many of our problems. We don't have to lay cables and build roads first to get people educated, provide medical services, care for their crops and safeguard them against natural disasters. Satellites have now empowered us to do all of this with much less effort and at a reasonable cost.

Satellite technology is dynamic, exciting and rewarding and can be applied to the benefit of everyone in Africa. It gives us hope.

I trust that through this publication we can make a contribution.

Anthony Penderis  
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Message from the President

Dear Members

It is a great honour, a privilege and a pleasure to succeed Prof. Jide Kufoniyyi as President of the African Association of Remote Sensing of the Environment (AARSE). I take this opportunity to thank all members of our association for the trust put in me.

AARSE plays an important role in the African geo-information community. It represents its members worthily in all forums of influence and testifies not only to the dynamism of its members and administrators, but also to the willingness of African decision-makers to create a space where geo-spatial experts will be in the limelight.

Mustering and promoting continues to be the primary mission of AARSE. Of course, our role as a scientific and professional Association will be at the center of our actions and it is therefore in consultation and collaboration with all the actors of the community that we will work to improve the networking between the science-technology and the socio-economic worlds.

Those who want to be a leader must also be a bridge; and AARSE must be this bridge that unites all the possibilities, to propel us collectively forward on the local, national and international scene.

In closing, I invite all members to be an active player in our Association and to make us benefit from their ideas and opinions. Your involvement is very valuable for the development of AARSE.

**Prof. Kamal Labbassi**  
Newly elected AARSE President for the 2018 - 2022 term of office

10 Reasons you should become an AARSE member today

1. You can make a bigger impact on remote sensing in Africa through the Association;
2. You are joining a dynamic and respectable organization founded in 1994 which has received the recognition and support of numerous international organizations;
3. By being a member of AARSE, you can get reduction in membership fees to many organizations and direct access to their publications;
4. AARSE strives to address remote sensing policies and research directions in Africa. By being a member, you can be a part of this important voice;
5. You can attend biennial AARSE Conferences at a reduced rate (or even sponsored in some cases) and also participate in the planning of AARSE events;
6. By becoming a member, you might be able to get the AARSE-IEEE/GRSS Travel Fellowship Award to attend their conferences;
7. If you are an expert in technical remote sensing topics you can join our Technical Program Committee and assist with workshops and training activities;
8. You can utilize the resources provided by AARSE (on remote sensing, GIS and ICT

education and training) offered through the courtesy of its partner organizations;

9. Quite often, AARSE suggests and promotes individual members as well as national/ regional members to sit in, or collaborate with, international fora;
10. Other benefits of AARSE Membership include subsidized subscription to the future AARSE Journal of Geoinformation and journals of its partner organisations.

See more at <http://www.africanremotesensing.org/Why-Join-AARSE>

Sign Up Now for AARSE Membership

You can select your membership level from one of the following: **Student Membership;** **Regular Membership A (residing inside Africa); Regular Membership B (residing outside Africa); SMME Membership; SMME with ARSGC; Corporate Membership; Corporate with ARSGC Membership**

See selection and payment options at the following links:

<http://www.africanremotesensing.org/page-1512797>

<http://www.africanremotesensing.org/Membership-Payment-Options>

Members of AARSE Council (2018 - 2022)

Name	Role	Term of office
Prof. Kamal Labbassi	President	2018 - 2022
Mahamadou Keita	Secretary General	2018 - 2020
Dr. Abel Ramoelo	Treasurer	2018 - 2022
Dr. Souleye Wade	Communications	2018 - 2022
Mahamadou Keita	Counsellor for West Africa	2016 - 2020
Prof. Islam Abou El-Magd	Counsellor for North Africa	2018 - 2022
Dr. Yazidhi Bamutaze	Counsellor for East Africa	2016 - 2020
Dr. Aboubakar Mambimba Ndjoungui	Counsellor for Central Africa	2018 - 2022
Dr. Solomon Tesfamicael	Counsellor for South Africa	2018 - 2022
Prof. Olajide Kufoniyyi	Immediate Past President	2018 - 2022

Board of Trustees

Prof. Olajide Kufoniyyi	Trustee
Dr. Woldai Tsehaie	Trustee
Prof. Harold Annegarn	Trustee and Bank signatory
Dr. Sias Mostert	Trustee and Bank signatory
Prof. Peter Zeil	Trustee

Some members of the newly elected AARSE Executive Council and Board of Trustees are from left: Prof. Islam Abou El-Magd; Prof. Kamal Labbassi (President); Dr. Souleye Wade; Dr Woldai Tsehaie; Prof. Olajide Kufoniyyi (Immediate Past President); Prof. Harold Annegarn; Mahamadou Keita; and Dr. Sias Mostert.





Overview

African Association of Remote Sensing of the Environment

12th International Conference

25 TO 29 OCTOBER 2018 · ALEXANDRIA, EGYPT

The 12th AARSE International Conference, AARSE2018, *Earth Observations and Geospatial Science in service of Sustainable Development Goals* was held in Alexandria, Egypt, at the Arab Academy of Science and Technology, from 25th to 29th of October, 2018.

AARSE 2018, a major event in the African and international community of Earth observation and geo-spatial information science in 2018, was organized by the African Association of Remote Sensing of the Environment (AARSE) and the Arab Academy of Science and Technology, in partnership with the National Authority for Remote Sensing & Space Sciences (NARSS). The event was sponsored by leading institutions such as AAST, NARSS, AUC, WFP, AIRBUS, ESA and WE.

- Conference Sub-Themes included :
- Space and Geospatial science for sustainable development goals.
  - Remote Sensing and GIS for natural resources management.
  - Remote Sensing of the Ocean and coastal zone management.
  - Applications of advanced remote sensing technologies (LiDAR, Hyperspectral) in Africa.
  - Climate changes implications on sustainable development in Africa.
  - Space technologies and geospatial sciences for early warning systems.
  - Big data and data mining of Geospatial data.
  - High-Performance Computing for Geospatial data analysis.
  - Influence of African Space policy on youth generation in Africa.

AARSE 2018 has brought together in the City of Alexandria leading university scientists and professionals from the African and international community to present their latest achievements, discuss challenges and share experiences.

The Conference program included keynote speeches, technical sessions with reports of the latest research outcomes, discussion sessions on operational topics such as capacity building, Spatial Data Infrastructure (SDI), space policy, programmes and projects. The programme

also presented commercial exhibitions showing latest products and services in remote sensing and geospatial information technologies.

AARSE 2018 selected the following participants as the winners of the best paper and best poster awards:

**Mohamed Abdel Rahman** and Hesham Aboelsoud from NARSS were awarded the European Space Agency Prize for the best poster for their poster titled: “Spatial distribution for soil physio-chemical properties of El-Sharkia Governorate using geostatistics”; **Ahmed M. El-Zeiny** was awarded the European Space Agency Prize for the Best Paper (Joint Second) for his paper titled: “Geomatics based approach for assessing Qaroun Lake Pollution”; **Elfatih M. Abdel-Rahman** was awarded the European Space Agency Prize for the Best Paper (Joint Second) for his paper titled: “Predicting the spatial distribution of the African Citrus Greening Disease Vector using an ecological niche modelling approach”; **Marwa S. Moustafa** was awarded the European Space Agency Prize for the Best Paper (Joint First) for his paper titled: “Machine learning approach for estimating the water level in the Nile Basin, Africa”; **Felix Rembold** was awarded the European Space Agency Prize for the Best Paper (Joint First) for his paper titled: “Anomaly Hot Spots of Agricultural Production, A New Early Warning Decision Support System”

Again warm congratulations to recipients and many thanks to the ESA for sponsoring the awards!

AARSE 2018 Conference recorded the participation of actors of all ages. Aboubakr (under 2 years) was the youngest actor I ever met at a scientific conference. Our best wishes to Aboubakr, the future of AARSE...

AARSE also recorded the participation of the Dean of African Remote Sensing Specialists, Mrs. Shahinaz Yousef, who gave an excellent communication on the relationship between solar peaks and the rising of East Africa water lakes. Mrs. Shahinaz Yousef has been warmly congratulated by the Conference with a standing ovation.

Dr. Souleye Wade  
AARSE Communications Manager



Dr. Souleye Wade AARSE Communications Manager



Aboubakr (under 2 years) the youngest actor at the conference.



Mrs Shahinaz Yousef gets a standing ovation after her lecture on the relationship between solar peaks and the rising of East Africa water lakes.

# AARSE2018 Fellowship Grants

The AARSE Council makes some Fellowship Grants available to promising students to attend their biennial conferences. The following are shortened reports from the four grantees who attended the AARSE2018 Conference in Alexandria, Egypt this year. The full reports will be published on the website in due time.



Ingrid Martha Kintu (above)

Having attended the 11th International Conference of the African Association of Remote Sensing of the Environment, AARSE2016, I was both glad and excited when I got the opportunity to attend this one as well. Given how much I learned from the previous one, I embarked on the journey to both attend and present my paper on the “Assessment of Lake Victoria’s Trophic Status using Satellite-Derived Secchi Disk Depth” which was submitted under the conference sub-theme of Remote Sensing of the Ocean and Coastal Zone Management.

I greatly benefited from this conference in more ways than one. It was a platform to publicize my work and let people know of what I am capable of doing. It was also a great opportunity to meet a number of professionals from a field that I am very passionate about and interact with them, not to mention the important connections that I was able to make. Another benefit was that I got to travel to Egypt, one of the countries that I have always wanted to go to.

In its totality, the conference was wonderful and the experience was definitely one that I will live to remember. I will always be grateful for the financial support I got from the IEEE GRSS-AARSE Travel Fellowship.

Aishetu Abdulkadir

There were eight plenaries sessions on relevant topics which generally enlightened us on contemporary findings and advancement in the field of geospatial science. These include: Public private partnership supporting geospatial information for sustainable development goals; Earth observation for Africa innovation and partnership in the Sentinels Era; Prospects and trends in remote sensing and the role of ISPRS; Ground-Based Passive UV-Vis Remote Sensing of Air Quality: Setting the stage for satellite validation and enhanced environmental monitoring in Africa; and Earth Observation Solutions addressing SDGs in support of key environmental challenges; Policy Considerations for Remote Sensing in Africa; Earth Observation Service: Key pillar of the African outer space programme in support to the implementation of the Agenda 2063 and needs, prospects and vision for an Integrated Geospatial Framework in Africa. Fundamentally, these enhanced our capacity and will enable us to improve the existing course synopsis.

In addition five workshops and nineteen parallel sessions were held to allow participants to present their research finding and interact with one another. Thanks you for giving me the opportunity to participate, and share experience with the international community.



Evet Naturinda (above)

I was privileged to present my research project for my Bachelor’s final year since my research was related to climate change implications. My paper was titled “Assessment of the Impact of Deforestation on Forest Carbon Storage”. I presented an oral presentation at the conference for fifteen minutes on Monday, 25th October under Technical Session 28. This conference gave an ideal platform for my research work because it was an international forum, consisted of researchers, education scientists, technologists and experts in remote sensing.

This conference acted as a platform to enhance a constructive dialogue and collaboration on themes relevant to remote sensing and to present the latest research results in this area. During the conference, I was able to attend numerous sessions from which I picked a lot of information and learnt a lot of new applications for remote sensing. In addition to the conference sessions, the chance to network with other people at the conference was an extremely valuable experience. I was able to interact with remote sensing experts from different African countries.

The opportunity to discuss current technologies with service experts was very worthwhile. Also, many thanks should go to my supervisors, Allan Mazimwe and Dr. John Richard Otukey for their generous support and guidance. Thank you, it was an opportunity to remember.



Rukayyah Bahago with her son Assad Mohammed



# AARSE2018 Conference Summary

AARSE2018 was the 12th International Conference of the African Association of Remote Sensing of the Environment held in Alexandria, Egypt, from 25 to 29 October this year.

This milestone event, the 12th AARSE biennial conference, where some 130 papers were delivered by delegates from 37 countries, was a true gathering of minds spearheading the African remote sensing business.

This 5-day event was hosted by the Arab Academy of Science and Technology, in partnership with the National Authority for Remote Sensing & Space Sciences (NARSS). The conference saw no less than 8 Plenary Sessions, 5 Workshop Sessions and 19 Technical Sessions where leading scholars, researches and industry practitioners shared their views, findings and latest products in

remote sensing and geospatial information technologies. The main conference theme for which scholarly papers were invited was 'Earth Observations and Geospatial Science in service of Sustainable Development Goals'.

This was further divided into 9 conference sub-themes which were the following:

- Theme 1:** Space and Geospatial science for sustainable development goals.
- Theme 2:** Remote Sensing and GIS for natural resources management.
- Theme 3:** Remote Sensing of the Ocean and coastal zone management.
- Theme 4:** Applications of advanced remote sensing technologies (LiDAR, Hyperspectral) in Africa.
- Theme 5:** Climate changes implications on sustainable development in Africa.
- Theme 6:** Space technologies and geospatial sciences for early warning systems.

- Theme 7:** Big data and data mining of Geospatial data.
  - Theme 8:** High-Performance Computing for Geospatial data analysis.
  - Theme 9:** Influence of African Space policy on youth generation in Africa.
- The AARSE conference series commenced in 1996, in Harare (Zimbabwe) and has been held in Abidjan (Cote D'Ivoire) in 1998, Cape Town (South Africa) in 2000, Abuja (Nigeria) in 2002, Nairobi (Kenya) in 2004, Cairo (Egypt) in 2006, Accra (Ghana) in 2008, Addis Abeba (Ethiopia) in 2010, El Jadida (Morocco) in 2012, Johannesburg (South Africa) in 2014, and in Kampala (Uganda) in 2016. The next conference in 2020 will be held in Rwanda.

See <http://www.aarse2018.org> for more information.







## AARSE Alexandria Declaration

29<sup>th</sup> October 2018

Delegates from 37 countries present at the 12<sup>th</sup> International AARSE Conference on "Earth Observation and Geospatial sciences in service to the Sustainable Development Goals" held at Alexandria, Egypt from 25<sup>th</sup> to 29<sup>th</sup> October 2018:

- Recognizing the role of Earth Observation in developing accurate geospatial datasets, information and knowledge to support the efforts of nations in achieving their national development agenda;
- Noting the importance of Earth Observation and Geospatial Science and Technology products and services in attaining the Sustainable Development Goals (SDGs) and the AU Agenda 2063, as well as the African Action Plan on the UN Global Geospatial Information Management (UN-GGIM) and other key national development and poverty alleviation strategies;
- Recognizing the final adoption of the African Space Policy and Strategy by the African Union Summit of Head of States;
- Recognizing the adoption of the Statute of the African Space Agency by the African Union Summit of Heads of State to start the process of the implementation of the African Space policy and strategy;
- Recognizing the importance of Africa's participation and contribution to the implementation of the GEO 2016-2025 Strategic Plan through AfriGEOSS; and noting an increase in a number of African countries and organisations participating in GEO;
- Noting that Africa is making major strides in space science and technology development with several countries developing successful space programs, including acquiring their own Earth Observation satellites;
- Recognizing the need to move from policies and strategies towards proper implementation and action in realizing the benefits of Earth Observation from space and Geospatial Information;
- Recognizing the necessity to build on existing capacity across the value chain from research and development, to technology, applications and operations;
- Recognizing the achievements of AARSE over the past two decades as major point of contact and facilitator of Earth Observation and Geospatial Information activities in Africa;
- Recognizing the role and contribution of the African Union and the United Nations Agencies such as the UN Economic Commission for Africa (UN-ECA) and building on previous declarations and multilateral coordination initiatives in space science and technology for sustainable development in Africa;
- Recognizing the importance and success of continued long term collaboration between international partners and African scientists in various joint programmes;
- Welcoming the input from international scientific societies including the IEEE Geoscience and Remote Sensing Society (IEEE GRSS), the International Society for Digital Earth (ISDE) and the International Society for Photogrammetry and Remote Sensing (ISPRS) that support the building of science base in Africa;
- Recognizing the role being played by GMES and Africa in implementing Earth observation on regional and continental scale for societal benefits;
- Recognizing the significant contribution of the United Nations Programs including UNDP, UNEP, WFP, etc.;

- Recognizing the solutions inherent in remote sensing in the alleviation of compounding environmental factors related to disasters, epidemics, poverty and the economic recessions;
- Recognizing the significant impact of Global Climate Change on African communities and the need to mitigate the impact and reverse the trend;
- Affirming the commitment of AARSE to the realisation of the above-mentioned initiatives and programmes;

## Hereby declare and call on the African Union and African Governments to:

- 1- Support the implementation of the Pan African Space Policy and Strategy and recognise the necessity for establishing the African Space Agency to manage and coordinate the implementation;
- 2- Urge African National Space Agencies and Remote Sensing Organisations to contribute to the implementation of the Pan African Space Policy and Strategy;
- 3- Encourage the development of national space policies and strategies flowing from and in line with the Pan African Space Policy;
- 4- Support the African Union Commission to strengthen Africa's space science and technology capabilities across the continent for the development of African nations;
- 5- Ensure the realisation of the AU Agenda 2063 and the African Action Plan on the UN Global Geospatial Information Management (UN-GGIM);
- 6- Stimulate African dialogue on space as a front-runner for innovation, technology development and job creation;
- 7- Build and invest in African capacity and capability, in both human resources and technology;
- 8- Encourage and support African universities and other institutions of higher education through adequate funding for fundamental and applied research and teaching in Earth Observation and geoinformation science and technology including the measuring of the indicators for the targets to be achieved by the SDGs;
- 9- Strengthen public-private partnership in space related activities and service delivery by private sector companies based on space-derived data;
- 10- Recognise the role of specialised institutions at both the national and continental levels in geoinformation and Earth Observation and the role that they can play with AARSE to improve the knowledge and capacity in Africa;
- 11- Increase local investments to complement external investments to ensure sustainability of Earth Observation in Africa.
- 12- Inspire Africa's youth through innovative space based education and outreach programs;

Signed in Alexandria, Egypt, on 29<sup>th</sup> October 2018

Prof. Olajide Kufoniyi  
President of AARSE

Prof. Alaa Abdelhady  
Vice President of AARSE

Prof. Mahmoud Hussein  
Head of NARSS

29 OCT 2018





From left to right :  
Dr. Souleye Wade (ASPG President), Cheikh Bakhroum (GICC President), Ms. Laurence Hart (Director of the French Development Agency / AFD, Agence Française de Développement) and Vincent Toussaint (Head of the Economic Department of the French Embassy in Senegal).

# GIS Colloquium Dakar, Senegal 27 November 2018

Organized by Business France, with the support of AFIGEO and ASPG

**Senegal, second-largest economy in Francophone West Africa is currently enjoying vigorous growth, allowing it to accelerate its economic and social development. With its National Plan for Geomatics (PNG, Plan National de Géomatique) established in 2009, it has become a pioneer country in promoting the use of geospatial information in the region.**

The Emerging Senegal Plan (PSE, Plan Sénégal Emergent) implemented by the Government and the private sector initiatives support this strong and marked trend. Ongoing development projects are therefore numerous and identified needs are important especially in terms of infrastructures and sustainable development. The well-established know-how in GIS of French companies and the Senegalese expertise in this field are therefore key drivers for a better partnership between Senegal and France.

The French government agency Business France which supports the international development of the French economy, organized a GIS Colloquium in Dakar, on 27 November 2018. This was done with the

support of AFIGEO (Association Française pour l'Information Géographique), lead by Mr. Jean Marie Seite and ASPG (Association Sénégalaise des Professionnels de la Géomatique) chaired by Dr. Souleye Wade.

At this important event a number of French and Senegalese GIS companies affiliated respectively to AFIGEO and ASPG took part. It is hoped that through their B2B discussions, GIS companies from both countries will find ways and means to collaborate and build up joint-venture geospatial projects for their mutual benefits.

Report by Dr. Souleye Wade, President of ASPG



# South African Space Industry in need of drastic shake-up

**The South African Space Industry is in need of a drastic shake-up otherwise the country will miss out on the Fourth Industrial Revolution now driving economies worldwide.**

Lack of funding and the fact that the country's space industry is not operating in a coordinated manner could be to blame. This is the message that Department of Trade and Industry (the dti) and the South African Council of Space Affairs (SACSA) received loud and clear at an October workshop in Cape Town to test the space fraternity's response to its Space Industry Development Framework and draft Space Legislation.

## Digital Economy

But it seems that SACSA whose mandate is to advise the dti on space legislation and related matters was well aware of the space industry's precarious position, hence the study and preparation of the new space legislation.

"We regard the space industry as one the strategic sectors in our country and an essential enabler to the digital economy and a driving force to Fourth Industrial Revolution worldwide," says Ms. Nomfuneko Majaja the dti's Chief Director.

"Apart from its obvious advantages in communication, it is also clear that space technology now finds application in just about every sector of governance in the domains of Energy, Agriculture, Forestry, Maritime, Mining, Mapping, Urban and Rural Development, Transportation, Intelligence and Disaster Management.

## Report to Presidency

"My vision therefore is that the South African Space Sector needs focussed co-ordination and should be led by a unit, which reports directly to the Presidency. In this way all government departments can be answerable to the Presidency and become accountable according to their respective sectoral mandates. Data is a key intelligence tool for effective management of government resources and service delivery. However, this cannot be possible without the government's commitment in supporting the industry as it is one of the highly technological ones and capital intensive with endless benefits for the economy and the country at large.



Ms. Nomfuneko Majaja, Chief Director of South Africa's Department of Trade and Industry

"This will put us in a better position to open up the digital economy to all South Africans not only in urban areas but also in far flung rural areas, where terrestrial infrastructure is not possible. It will improve service delivery and can help to reduce the inequalities we still experience in our country," says Ms. Majaja.

The report also highlighted the fact that buy-in of space data via commercial satellite operators is extremely costly and does not meet all South African needs; that the South African National Space Agency (SANSA) compared to 24 national space agencies worldwide has to operate on the third lowest annual budget of only 9.5 million US dollars (2017); and that South Africa has slipped back from being the leading African space nation now to sharing the number one spot with Algeria both with a total of 6 satellites in space. The Algerian Space Agency (ASAL) operated on a budget of 360 million US dollars last year.

The workshop titled 'Building a Development Framework for the South African Space Sector' was organized by the South African Department of Trade and Industry at the Cape Peninsula University of Technology (CPUT) on 15 October 2018. It was a two-pronged workshop with the objective to present the Draft Space Industry Development Framework compiled by Blueprint Holdings (PTY) Ltd as well as SACSA's draft Space Legislation to the country's space stakeholders for comments.

The draft Space Legislation to be introduced in Parliament by September 2019 was presented by Ms. Nomfuneko Majaja the dti's Chief Director.

More information: [josie@blueprintgroup.co.za](mailto:josie@blueprintgroup.co.za) or [nmajaja@thedti.gov.za](mailto:nmajaja@thedti.gov.za)

Some of the most important recommendations contained in the Space Industry Development Framework report presented at the workshop can be summarized as follows:

1. The South African socio-economy cannot become more equal without access to space-based communications and space-enabled data;
2. Space technology can very quickly reduce costs for government (data and communications) and can increase earnings in the short, medium and long term - especially through profit and exports. This can also enable intelligent decision making;
3. Access to satellite generated data, and the information derived from this in real time, can improve the performance for every single government department and speed up service delivery without exception from Social Services to Agriculture;
4. It can provide access for remote and deprived communities to most needed specialized health, advanced education and other services they currently have no access to;
5. Space-enabled data can also assist SMME's in assessing networks which could open endless opportunities in the field of consumer application;
6. Services related to Spaceports, including launch services and potentially space tourism will facilitate infrastructure development, related jobs and potentially, a tourism offering, however this is seen as long-term developments;
7. Industry should operate in a coordinated fashion of clustering their activities;
8. Broadening participation should be the cornerstone of all space development for inclusive growth.

Article by Anthony Penderis: [admin@anthonypenderis.com](mailto:admin@anthonypenderis.com)



# Ethiopia to launch first satellite next year

By ANDUALEM SISAY

**Ethiopia is set to launch its first earth observatory satellite in September 2019, joining a list of few African countries that have put the devices into orbit.**

“The satellite will be launched from China while the control and command station will be in Ethiopia,” said Dr. Solomon Belay Tessema, the director general of the Ethiopian Space Science and Technology Institute at the Addis Ababa University. He added that “most preliminary and critical design is done by our scientists.”

China has provided training and \$6 million for the project, according to Dr. Solomon. He said the design, development and manufacturing of the satellite, done in collaboration with the Chinese, cost \$8 million.

“Our main goals for launching this first satellite are two. The first is to build technology application capacity and skills of our engineers through collaborations with different countries’ space scientists and institutions,” said Dr. Solomon.

He noted that the technology and knowledge transfer will enable the Ethiopian scientists “design, build and launch the second satellite independently.”

There are 20 Ethiopian aerospace engineers involved in the satellite project. About 60 masters and PhD students are also taking part in research and training at the space institute as well as the country’s multibillion-dollar Entoto Observatory and Research Centre, Dr. Solomon said.



Ethiopia’s multibillion-dollar Entoto Observatory and Research Centre has two one-metre telescopes and a spectrograph to measure wavelengths of electromagnetic radiation.

The Entoto observatory centre, the only of its kind in the region, has two one-metre telescopes and a spectrograph to measure wavelengths of electromagnetic radiation.

Ethiopia will join seven other African countries that have built and launched satellites. They are South Africa, Egypt, Nigeria, Ghana, Algeria, Morocco, and neighbouring Kenya – which launched its nano-satellite in May 2018.

Source  
<https://www.nazret.com/2018/11/04/ethiopia-to-launch-first-satellite-next-year/>

## Africa eyes mobile gaming boom

by Gregory WALTON | Agence-France Presse

“There’s enormous potential in Africa because the continent is primarily mobile,” said Sidick Bakayoko, 34, the founder of Paradise Game, an umbrella group for developers in Ivory Coast.

“We’ve done a jump and instead of first going with PC, we’ve gone directly to mobile,” he told AFP at last week’s Africa Games Week convention in Cape Town which brought together African games coders, developers and artists with top executives from Sony and other industry giants.

Google’s decision in June to allow games developers from African countries including Nigeria, Zimbabwe, South Africa and Tanzania

to make money from their creations sold on its Play Store could revolutionise the sector.

Africa’s video game industry, currently worth \$310 million, would be worth \$642 million by 2021.

<https://au.news.yahoo.com/attack-small-screens-africa-eyes-mobile-gaming-boom>



Sidick Bakayoko, 34, from the Ivory Coast, the founder of Paradise Game

## Africa’s List of National Space Agencies

The following is a list of African countries with Space Agencies created by Space in Africa this year. While some countries have established space agencies backed up by national laws, some countries have research centres that coordinate space activities in the country.

Algeria Space Agency – Algeria

South African Space Agency – South Africa

National Space Research and Development Agency – Nigeria

Egypt Space Agency – Egypt

Kenya Space Agency – Kenya

Zimbabwe National Geospatial and Space Agency – Zimbabwe

Gabinete de Gestao do Programa Espacial Nacional – Angola.

The Royal Center for Remote Sensing Space – Morocco

Ghana Space Science and Technology Centre – Ghana

Libya Center for Remote Sensing and Space Science – Libya

National Remote sensing Center (NRSC) – Sudan

Tunisia Space Agency – Tunisia

Ethiopian Space Science Society – Ethiopia

Source  
<https://africanews.space/list-of-space-agencies-in-africa/>

# Morocco flies second satellite in one year

**The Kingdom of Morocco had its second earth observation satellite The MOHAMMED VI – B launched on Tuesday, November 20, 2018 from the Guiana Space Center, Europe’s Spaceport in French Guiana (South America).**

The MOHAMMED VI – B will join the Mohammed VI-A satellite launched a little over a year ago on November 8, 2017 in an orbit 700km above the earth.

The MOHAMMED VI – B is a civilian satellite and will mostly be used for mapping and land surveying, regional development, agricultural monitoring, the prevention

and management of natural disasters, monitoring changes in the environment and desertification, and border and coastal surveillance. It will be capable of taking very high technological definition images in less than 24 hours with a resolution of up to 70 cm.

The satellite of 1,110 kilogrammes was designed by the Franco-Italian consortium Thales Alenia Space acting as an agent and the French Airbus Defence & Space agency.

This is Arianespace’s ninth launch of the year, and the second using Vega in 2018. The launch also marks the 13th successful mission in a row for Vega since it entered service in 2012. Arianespace stated that its light launcher is a perfect match for the requirements of both government and commercial customers.

Sources:

<https://www.youtube.com/watch?v=x5o4nu6XSks>

<https://currentaffairs.gktoday.in/mohammed-vi-b-morocco-launches-earth-observation-satellite-11201862733.html>



The MOHAMMED VI – B satellite being readied for the launch inside the nose cone to be placed on a Vega rocket.

Karim Tajmouati Head of Delegation of the Kingdom of Morocco addressing the audience at the launch site control centre after the launch.



# Ethiopia hosts 2019 African Leadership Conference

The African Leadership Conference (ALC) steering committee have announced Ethiopia to be the host of the 8th African Leadership Conference on Space Science and Technology for Sustainable Development in 2019. This was done during the just concluded 7th conference held in Abuja, Nigeria from 5 to 7 November 2018.

The African Regional Conference is organized bi-annually to gather all experts and key players in Space Science and Technology in Africa with the view to promoting intra Africa cooperation in the use of space science and technology to support Africa’s development.

The ALC has come to be regarded as a representative African forum in the global

## Second African Space Generation Workshop in Mauritius this month

The second African Space Generation Workshop for young African professionals will be held in Port-Louis, Mauritius on the 17th and 18th of December 2018.

This follows on the success of the first African Space Generation Workshop (AF-SGW) in Nigeria last year. The workshops are organized by the Space Generation Advisory Council (SGAC) in support of the United Nations Programme on Space Applications

The two-day regional workshop will bring together students, young professionals and industry representatives to examine, consider and stimulate interdisciplinary perspectives on space and scientific matters in the African region. Some 100 selected participants will have the opportunity to interact with experts from academia, businesses and space agencies through plenary and panel sessions, keynotes and interdisciplinary working group discussions.

For more information see [www.spacegeneration.org/afsgw2018](http://www.spacegeneration.org/afsgw2018) or contact [af-sgw@spacegeneration.org](mailto:af-sgw@spacegeneration.org)





# Sculpture in space honours world's first black astronaut

The world's first black astronaut selected for training in 1967, but who died six months later, in an F-104 Starfighter jet crash has just been honoured with a sculpture of him launched into space to circle the earth for 7 years in a sun-synchronous orbit.

The Falcon 9 rocket which took off from Vandenberg Air Force Base in California on Sunday, 2 December carried a unique cargo into orbit alongside the usual communications and observation satellites—the “soul” of Robert Henry Lawrence Jr., the first African American astronaut.

The launch manifest for the SSO-A SmallSat Express mission, organized by Seattle-based Spaceflight Industries, lists a spacecraft called Enoch, owned by LACMA—the Los Angeles County Museum of Art.

Enoch contains a 24-karat-gold canopic jar with a bust of Lawrence. Canopic jars were used by ancient Egyptians to house the organs of the deceased for use in the afterlife. This jar was blessed at a Shinto shrine in Japan and “recognized as a container for Lawrence's soul,” according to the museum.

“Lawrence is someone who has a mostly untold story, who I look at as a hero but who wasn't necessarily considered one when I was a child in school,” says Tavares Strachan, the artist behind Enoch, in an interview with IEEE Spectrum.

Although Guion Bluford Jr. was the first African American to reach space, on a space shuttle in 1983, Lawrence was the first black astronaut, selected for training in 1967. Six months later, Lawrence died in the crash of an F-104 Starfighter jet while teaching a junior pilot.

“A black guy doing space exploration with the U.S. government wasn't a normal situation in 1960s America. He was traversing a very difficult time,” says Strachan. Strachan first learned about Lawrence while researching an earlier project on cultural invisibility—the tendency for minority figures to get written out of history.



U.S. Air Force Maj. Robert Henry Lawrence Jr. standing next to an F-104 Starfighter. Credit: U.S. Air Force

The 24-karat-gold canopic jar with a bust of Lawrence which will orbit Earth for 7 years. Designed by the artist Tavares Strachan

Sources:  
<https://spectrum.ieee.org/tech-talk/aerospace/satellites/spacex-to-launch-cubesat-containing-soul-of-first-africanamerican-astronaut>  
<https://www.space.com/42572-spacex-rocket-launch-robert-lawrence-sculpture-art>

## The satellite data: Copernicus Sentinel-1



Sentinel-1 is the Copernicus radar mission, providing an all-weather, day-and-night supply of imagery of earth's surface. The mission consists of two satellites embarking C-band synthetic aperture radars (SARs) in continuity of the ESA's ERS-2 and Envisat missions. The mission images the entire earth every six days for the benefit of manifold applications such as, for example, monitoring of Arctic sea-ice extent, surveillance of the marine environment, monitoring land-surface for motion risks, mapping for forest, water and soil management.

Copernicus Sentinel's data are available under an open and free data policy.

Sentinel-1 data can be accessed at <https://scihub.copernicus.eu>

More info: <https://sentinels.copernicus.eu>

## Free Copernicus Sentinels Imagery

The Copernicus Open Access Hub (previously known as Sentinels Scientific Data Hub) provides complete, free and open access to Sentinel-1, Sentinel-2, Sentinel-3 and Sentinel-5P user products, starting from the In-Orbit Commissioning Review (IOCR). Sentinel Data are also available via the Copernicus Data and Information Access Services (DIAS) through several platforms .

Visit their User Guide for getting started with the Data Hub Interface. Discover how to use the APIs and create scripts for automatic search and download of Sentinels' data. Latest update: see the section on Long Term Archive for the upgrade of the interfaces for access to offline data.

Anyone can register online via self-registration. The self-registration process is automatic and immediate. Registration grants access rights for searching and downloading Sentinels products. Sentinels products are available at no cost to anybody. The data available through the Data Hub is governed by the Legal Notice on the use of Copernicus Sentinel Data and Service Information, which the User is deemed to have accepted by using the Sentinel data.

For further details or requests of support please send an e-mail to [eosupport@copernicus.esa.int](mailto:eosupport@copernicus.esa.int)

# InSight unlatches its robotic arm on Mars

NASA's InSight spacecraft unlatched its robotic arm on Nov. 27, 2018, the day after it landed on Mars.

InSight is the first mission to focus on examining the deep interior of Mars. Information gathered will boost understanding of how all rocky planets formed, including Earth.

The spacecraft launched from Vandenberg Air Force Base in California on May 5,

2018. After a six-month cruise, InSight landed on Mars on Nov. 26, 2018, at 11:52:59 a.m. PT (2:52:59 p.m. ET) and began Mars surface operations.

The phases of the InSight mission include:

**Pre-Launch** | Preparing for the mission includes pre-project planning, science definition and instrument selection, landing site selection, assembly and testing, and delivery of the spacecraft to Vandenberg Air Force Base.



Assembly at the Vandenberg Air Force Base in California

Source: <https://mars.nasa.gov/resources/22178/unlatching-insights-arm/?site=insight>

**Launch** | InSight lifted off from Vandenberg Air Force Base on an Atlas V-401 on May 5, 2018, in the pre-dawn hours, at 4:05 a.m. PT (7:05 a.m. ET). This was the first inter-planetary launch from the west coast.

**Cruise** | The time between InSight's launch and arrival at Mars is called the cruise phase of the mission. This part of the trip takes about six months.

**Approach** | The approach phase begins about 60 days before landing with a series of checkouts.

**Landing** | The entry, descent, and landing phase is InSight's final plunge through the Martian atmosphere. It lasts about six minutes and delivers the lander safely to the surface.

**Surface Ops** | After a safe landing, InSight deploys its instruments in preparation for surface operations. The lander begins its day-to-day science activities about 30 days into the mission.



This image from InSight's robotic-arm mounted Instrument Deployment Camera shows the instruments on the spacecraft's deck, with the Martian surface of Elysium Planitia in the background. The image was received on Dec. 4, 2018 (Sol 8).

## NASA chooses nine companies to bid on flying to Moon



Credit: Bill Ingalls/NASA

NASA Administrator Jim Bridenstine (far left) and Associate Administrator for the Science Mission Directorate Thomas Zurbuchen (far right) pose for a photograph with the representatives of the nine U.S. companies that are eligible to bid on NASA delivery services to the lunar surface through Commercial Lunar Payload Services (CLPS) contracts. NASA announced the companies Nov. 29, 2018 at the agency's headquarters in Washington, D.C. Of the group, the only well-known name

is aerospace giant Lockheed Martin, which has a long track record of success with NASA and built the InSight lander that touched down Monday on Mars. The others are Astrobotic Technology, Inc.; Deep Space Systems; Draper; Firefly Aerospace, Inc.; Intuitive Machines, LLC; Masten Space Systems, Inc.; Moon Express; and Orbit Beyond. The move is part of NASA's goal of sending people to the Moon in the next decade, for the first time since the Apollo era of the 1960s and '70s.



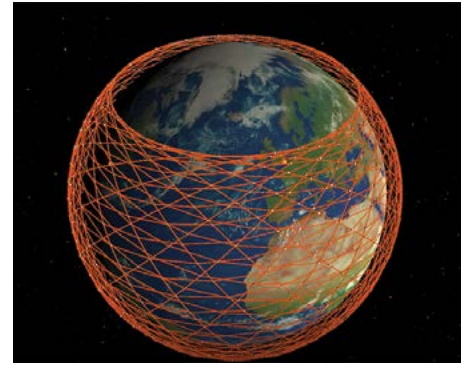
## Second launch for two astronauts after Soyuz fail



NASA astronauts Nick Hague and Christina Hammock Koch and Alexey Ovchinin of the Russian space agency Roscosmos are scheduled to launch Feb. 28, 2019, from the Baikonour Cosmodrome in Kazakhstan for a mission to the International Space Station as members of Expeditions 59 and 60. This will be Koch's first spaceflight. Hague and Ovchinin were scheduled to join the station's Expedition 57 crew on Oct. 11, but were forced to abort their mission when their Soyuz's rocket booster experienced a malfunction shortly after launch. Flight dynamics specialists determined Hague and Ovchinin achieved enough altitude on their aborted climb to orbit to qualify for previous spaceflight status, making this Hague's second spaceflight and Ovchinin's third.

During their mission, the station crew will take part in about 250 research investigations and technology demonstrations not possible on Earth to advance scientific knowledge of Earth, space, physical, and biological sciences. Science conducted on the space station continues to yield benefits for humanity and will enable future long-duration human and robotic exploration on missions to the Moon and Mars. The crew also is scheduled to be onboard during the first test flights of NASA's Commercial Crew Program, which will return human spaceflight launches to U.S. soil.

Credits: NASA <https://www.nasa.gov/>



### SpaceX to launch 7,518 internet satellites

The Federal Communications Commission (FCC) approved SpaceX's request to deploy 7,518 satellites for its Starlink constellation, which aims to provide broadband internet services. This follows hot on the heels of requests approved by the agency OneWeb, Space Norway and Telesat over the past year to provide broadband services using similar Non-Geostationary Earth Orbit (NGSO) satellite systems.

The Commission granted SpaceX's application with certain conditions, authorizing SpaceX to construct, deploy, and operate this new very Low Earth Orbit (LEO) constellation using V-band frequencies. It also granted SpaceX's request to add the 37.5-42.0 Gigahertz, and 47.2-50.2 GHz frequency bands to its previously authorized Non-Geostationary Satellite Orbit (NGSO) constellation. The Commission's action provides SpaceX with additional flexibility to provide both diverse geographic coverage and the capacity to support a wide range of broadband and communications services for residential, commercial, institutional, governmental, and professional users in the United States and globally.

Photo: Mark Handley, University College London  
Source: <https://www.satellitetoday.com/broadband/2018/>

## India launches 'The Big Bird'

India's heaviest satellite dubbed the 'Big Bird' has gone into orbit on a French rocket to help boost broadband internet services. Weighing about 5,854kg (12,906lb), the GSAT-11 is India's "most-advanced" multi-band communication satellite.

The Indian Space Research Organisation (Isro) launched the satellite from the Kourou spaceport in French Guiana early on Wednesday morning. It will be placed in a geostationary orbit by the end of this month and its transponders will be switched on. Isro chief K Sivan told reporters that the satellite will "play a vital role in providing broadband services across the country".

Scientists say it will provide internet access to "off-grid" remote areas in India - hills and islands, for example - where traditional fixed-line broadband services are not available and would be helpful during emergencies and disaster relief. And it will also help provide internet connectivity during air travel in India.

India hired a French rocket to carry the satellite, which is expected to have a life span of 15 years, because it does not have a rocket to carry such a heavy payload.

There are more than 440 million internet users in India, and the number is expected to double by 2022. However, slow speeds or lack of services still affect access in the remotest areas where there is no cable connectivity.

Source: <https://www.bbc.com/news/world-asia-india-46451070>